Prevalence of Incisors Crowding in Saudi Arabian Female Students

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Abstract
This study was carried out to determine the prevalence of incisor crowding in Saudi Arabian female students. A group of one thousand sixty four (1064) Saudi female school students, with an age range (13-19 years) were randomly selected from governmental and private schools in different districts at Jeddah city. Clinical examinations were performed to evaluate the maxillary and mandibular incisors crowding using the method described by (Little, 1975). The findings indicated that 18.6% of the students have well-aligned incisors. Incisor crowding decreases by age in the upper and the lower arches. (81.4%) of the examined sample had different degrees of incisors crowding. Mandibular incisors crowding were more prevalent than the maxillary incisors crowding.

Introduction
As malocclusion is considered to be a public health problem (Draker, H.L., 1960 (1)), the prevalence of occlusal anomalies, the need and demand for orthodontic treatment should be ascertained within a given community as reported by several authors (Stephens et al., 1985 (2); Peter A. Hill., 1992 (3))

The prevalence of incisors crowding in class I malocclusion of 596 English children aged 11-12 years was estimated by Haynes S., 1970 (4). He found that crowding was the most prevalent malocclusal defect with (80.23%).

Brunelle et al. 1996 (5), conducted a study as part of oral health survey in United States (U.S.) carried out by Public health service on the prevalence of occlusal characteristics for 7000 persons from 8 to 50 years between the years 1988 and 1991. They reported that 22% of examined individuals had no incisor displacement in the mandibular arch, and 25% had no displaced incisors in the maxillary arch.

Hill P. Al. 1992 (3), did an epidemiological investigation involving 765 Glasgow schoolchildren aged 9-15 years to assess the prevalence and severity of malocclusion. He reported that crowding was present in 68.8% of the individuals examined, however, only 10% of the crowded cases needs orthodontic treatment.

In Nigeria, the prevalence of incisors crowding in 617 schoolchildren with age range 10-19 years, were reported by Isiekwe 1983 (6), he founded a very low prevalence of incisor crowding in Nigerians of about 12.9%.

In developing country like Saudi Arabia, where the practice of orthodontics is limited, the prevalence of orthodontic problems and comparing the results with other similar studies is essential to estimate the need of orthodontic treatment practice. 1

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Bryan Jones W. 1987 (7), conducted a study in 132 Saudi Arabian patients attending the orthodontic clinic at the Riyadh Armed Forces Hospital. He reported that incisor crowding was present in 67.4% of the examined sample.

Al-Emran et al. 1990 (8), conducted a study in 500 Saudi Arabian male students within the age range 13-14 years, he reported that incisor crowding was seen 42.8%. Maxillary crowding 19.4% and mandibular crowding was 23.4%.

The pattern of different malocclusal features in 641 Saudi patients with age ranges 5-22 years, attending for orthodontic treatment at the college of dentistry, King Saud University, Riyadh was examined by Al-Balkhi and Al-Zahrani, 1994 (9). They found that crowding was the most common finding (49.5%) distributed mainly as anterior crowding.

All of the previous studies were done in the Central Region, (Riyadh city), and further studies in the eastern region are needed to confirm their findings.

The purpose of this investigation is to determine the prevalence of incisor crowding in the maxillary and mandibular dental arches among Saudi school female students in the city of Jeddah (the Eastern Region of Saudi Arabia) and to compare the data with other similar studies.

**Material and method**

This investigation comprised of one thousand sixty four (1064) Saudi female school students, within an age range (13-19 years). They were randomly selected from governmental and private schools in different districts of Jeddah city. Socio-economic differentiation of the sample was not attempted.

All students from each school attending on the day of examination were examined. Inclusion criteria were as follows:

1. Age ranged from 13 to 19 years
2. No previous orthodontic treatment.
3. Presence and complete eruption of all permanent teeth excluding third molars.
4. Absence of large fillings, fractured or malformed anterior teeth.
5. No previous history of permanent teeth extraction.
6. Saudi Arabian origin

The clinical examination was carried out in the school in good daylight using disposable tongue depressors to retract the lips if needed during anterior segment examination. The students were questioned about possible earlier extractions of permanent teeth and those with positive history were excluded from the study.

The scoring method of incisor crowding involves clinical examination of linear displacement (labio-lingually) of anatomic contact points of each maxillary and mandibular incisor from the adjacent tooth. Five displacements from the mesial aspect of the right canine to the mesial aspect of left canine were examined. (Little, 1975(10)) Figure (1).
In the present study, the incisors were viewed occlusally while the mouth is open and the five labio-lingual displacements were examined to assess the presence or absence of incisor crowding (slipping of one contact is considered crowding; the degree of crowding is not included in this study).

Incisor crowding were scored as follows:
- **Incisor crowding in both arches** = 0 labio-lingual displacements between the upper incisors and lower incisors (crowding existed in both arches)
- **Upper incisor crowding** = 1 labio-lingual displacements between the upper incisors only, whereas the lower incisors shows no crowding
- **Lower incisor crowding** = 2 labio-lingual displacements between the lower incisors only, whereas the upper incisors shows no crowding.
- **No incisor crowding** = 3 No labio-lingual displacements of incisors in both of the arches. Any mesio-distal separation between the teeth is ignored and the score was 3 (no crowding).

Two orthodontic examiners examined all the participants; one of them is the author. Previous calibrations on the slipping of the labio-lingual contact between the incisors were done before the field examination as a part of quality control analysis.

**Results**

Table (1) represents the overall percentage (%) distribution of incisor crowding among the 1064 female students. (81.4%) of the sample had different degrees of incisor crowding. Whereas, (18.6%) of the total sample size have well aligned incisors in both arches.

<table>
<thead>
<tr>
<th>Incisors crowding</th>
<th>Frequency (n)</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incisors crowding</td>
<td>866</td>
<td>81.4</td>
</tr>
<tr>
<td>No incisors crowding</td>
<td>198</td>
<td>18.6</td>
</tr>
<tr>
<td>Total</td>
<td>1064</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 1

Overall frequency (n) and percentage (%) distribution of incisors crowding in 1064 Saudi Arabian female students
Figure (2) presents, the percentage (%) distribution bar chart of incisors crowding pattern among the 1064 female students. (60.6%) of the examined students shows crowding in both arches (Bimaxillary crowding). Whereas lower incisors crowding alone were seen in (13.2%) and upper incisors crowding alone were seen in (7.6%).

Cross-tabulation in table (2) shows the incisors crowding frequency of the 1064 female Saudi Arabian students distributed according to the age ranges. The age range 17-19 years exhibits the highest frequency of well aligned incisor.

**Table 2**
Cross-tabulation between the overall incisors crowding frequency (n) and the age ranges in 1064 Saudi Arabian female students
Comparison clustered bar chart in figure (3) shows incisors crowding in 1064 female Saudi Arabian distributed according to their age ranges. Age ranges 13-15 years shows the highest frequency of incisors crowding among all of the age groups.

Discussion

Studies concerning the prevalence and incidence of occlusal trait such as incisor crowding in young adults provide essential epidemiological data. The information obtained may be used to assess the state of dental health and form a baseline for planning future dental care programs in the society, Rolling, 1980(11).

The number of patients seeking orthodontic treatment in Saudi Arabia has increased markedly during recent years. Therefore it is important to have relevant epidemiological data on different types of malocclusion in order to estimate the total need for treatment.

The method described by (little, 1975(10)) was used to determine the presence or absence of incisor crowding. Little, 1975, described the degree of incisor crowding using the irregularity index expressed as the total of millimeter distance from the contact point on each tooth to the contact point it should touch.

In the present study due to the large number of the examined sample, no attempts were made to measure the degree of incisor crowding (irregularity index), slipping of any of the incisor contact as described by (little, 1975(10)) indicated the presence or absence of incisor crowding.

Most clinical studies investigating crowding prevalence had used slipping of the contact point between teeth as indication for crowding, (4, 5, 6, 7, 8, 9, and 10)

The age ranges of the examined sample were (13-19 years) because at this age range all the permanent incisors are full erupted to the level of occlusion and this was
necessary in order to obtain a clear and valid picture of the prevalence and distribution pattern of incisors crowding in the presence of all of the permanent teeth. This study shows a low incidence of well aligned incisors (18.6.4%) and high incidence of incisors crowding (80.4%), which were in agreement with other the investigators that have reported similar incidence (Haynes S., 1970 (4) and Hill P. Al. 1992 (3) in UK, Brunelle et al. 1996 (5) in U.S. and Bryan Jones W. 1987 (7) in Saudi Arabia).

The present study confirms the findings of Al-Emran et al. 1990 (8) and Al-Balkhi & Al-Zahrani, 1994 (9), that the majority of Saudis have high incidence of incisor crowding in both arches. However, this study show s a higher percent (80.4%). The explanation of this anomaly could be that in Al-Emran et al. and Al-Balkhi et al. studies, the crowding was considered present if there was 2mm or more dental arch insufficiency, neglecting the minor crowding that was accounted in this study. Other explanation was due to the difference between the age groups in Al-Balkhi et al. study, they included younger Saudi Children.

The prevalence of incisor crowding in the Nigerian population done by Isiekwe 1983 (6), was much less prevalent (12.9%), compared to the results of the present study (80.4%). This difference could be due to different of racial and ethnic origins of both populations. The Nigerian population are black African in origin (Negroid race), whereas, the subjects of the present study are of Saudi Arabian in origin (Basic Mediterranean race). Isiekwe, stated that the low prevalence of incisors crowding in black Africans maybe attributed to the broad arches, and favorable dento-alveolar ratio.

Bimaxillary incisor crowding was the most common type in the present study and this occurred in 60.6% in contrast to mandibular incisor crowding alone (13%) and the least were the maxillary incisor crowding alone (7.6%), this finding was in good agreement with (Haynes S., 1970 (4) and Isiekwe 1983 (6)). However, all the investigators including this study agreed that the mandibular incisor crowding alone have higher incidence than the maxillary incisor crowding alone (4, 5, 6, 7, 8, 9, and 10).

In the present study, the age range 17-19 years exhibits the highest frequency of well aligned incisor and age ranges 13-15 years shows the highest frequency incisors crowding among all of the age groups Figure (3). The significant reduction in the percentage of students presenting with incisor crowding with age have been also noticed by others (13-15). Helm 1970 (12) noticed that crowding in the anterior segment increases during development especially in the mandible. Foster et al.1970 (13), demonstrated that crowding tends to increase until 13 or 14 years of age than tends to decrease until late teens.

The results of this study does not, however indicate the orthodontic treatment demand by the Saudi Arabian population at large due to our inability to asses the amount of incisor crowding for all the participants. Further attempts are needed to measure the irregularity index of this study sample to estimate the extent of incisor crowding that needs orthodontic treatment.
Conclusion

The conclusion that can be drawn from this study is that the prevalence crowding of one or more incisors was a common feature in the Saudi Arabian female students at Jeddah city. It was more common in the mandibular arch than the maxillary arch and incisor crowding tends to decrease with age.

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References


